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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Azat M. Latypov

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EXAMINER

RASHID, DAVID

ART UNIT

PAPER NUMBER

2624

MAIL DATE

DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/765,948	Applicant(s) LATYPOV ET AL.	
	Examiner DAVID P. RASHID	Art Unit 2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 January 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3,5-7,9,10,13,15 and 18-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3,5-7,9,10,13,15 and 18-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

[1] All of the examiner's suggestions presented herein below have been assumed for examination purposes, unless otherwise noted.

Amendments

[2] This office action is responsive to the claim and specification amendment received on January 16, 2008. Claims 1-3, 5-7, 9-10, 13, 15, and 18-24 remain pending; claims 4, 8, 11-12, 14, and 16-17 cancelled; claims 22-24 new.

Claim Rejections - 35 USC § 112

[3] In response to applicant's 35 USC § 112 rejection amendments and remarks received on January 16, 2008, the previous 35 USC § 112 rejections are withdrawn.

Claim Rejections - 35 USC § 103

[4] The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

[5] **Claims 1-3, 5-7, 9, 13, 15, 19-21 and 24** are rejected under 35 U.S.C. 103(a) as being unpatentable over Sandstrom (US 6,399,261 B1) in view of Yonekubo et al. (US 6,014,360 A) and Latta et al. (US 5,253,236 A).

Regarding **claim 1**, while Sandstrom discloses a method (Col. 2, lines 27 - 53) comprising:

applying a voltage (Col. 5, lines 12 – 13; Col. 13, lines 30 - 35) having a voltage value (any applied voltage has a “voltage value”) to pixels (FIG. 2; FIG. 3; FIG. 4) in a spatial light modulator (SLM) (FIG. 4; Col. 2, lines 66 – 67; FIG. 6, element 601) to move the pixels (FIG. 4);

reflecting light from the moved pixels (FIG. 4);

passing the reflected light (Col. 12, lines 15 - 17) through an apodized pupil (FIG. 4, elements 402, 404; FIG. 6, elements 608, I_1 , I_2) in an optical system (FIG. 6, element 604);

capturing an image from the light after it passes through the apodized pupil (“CCD camera” in Col. 13, lines 3 - 7);

correlating the image and the voltage value to generate a result signal (“...series of test patterns...” in Col. 13, lines 27 - 31); and

calibrating the pixels using the result signal (Col. 13, lines 20 - 34), Sandstrom does not teach using a semi-plane knife-edge to block from one side a zero order lobe of a pixel diffraction pattern at the apodized pupil (though Sandstrom suggests there exists a lobe (whether main or side is not specified) that is blocked from a pixel diffraction pattern at the apodized pupil).

Yonekubo discloses an optical recording medium that teaches blocking a portion of a zero order lobe (FIG. 26, element 39 and FIG. 28, element 43 are the primary lobes that have blocked portions due to the slit) of a pixel diffraction pattern (FIG. 10, element 4a) at the apodized pupil (circular objects in FIG. 26 and FIG. 28)

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the apodized pupil of Sandstrom to include blocking a portion of a zero order lobe of a pixel diffraction pattern as taught by Yonekubo to create “a method of providing means for imparting a phase difference to the laser beam entering the objective lens is also applicable as another method for causing the foregoing optical super-resolution phenomenon.”, Yonekubo, Col. 3, lines 60 – 64 and “[b]y further shielding part of the main lobe, detrimental noise components mixed in the main lobe

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can be removed, thereby further improving the quality of a regeneration signal”, Yonekubo, Col. 3, lines 27 – 30.

Latta teaches using a semi-plane knife-edge (fig. 4, element 74) to block light from one side (fig. 4).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the device used for blocking a zero order lobe of a pixel diffraction pattern at the apodized pupil of Sandstrom in view of Yonekubo to use a semi-plane knife-edge to block from one side as taught by Latta as “[t]he knife-edge technique allows the system to distinguish between light coming from the upper and lower apertures 66 and 68 in the mask...and on the other side of the focus it blocks light from the lower aperture”, Latta, col. 4, lines 41-47.

[6] Regarding **claim 2**, Sandstrom further comprises individually resolving each of the pixels (“...for every corresponding SLM pixel...” in lines 31 - 34) using the apodized pupil (FIG. 4, elements 402, 404; FIG. 6, elements 608, I_1 , I_2).

[7] Regarding **claim 3**, Sandstrom further comprises using a charge coupled device (CCD) to perform the capturing step (“CCD camera” in Col. 13, lines 3 - 7).

[8] Regarding **claim 5**, Sandstrom discloses wherein the image of each of the pixels is captured using more than one cell in the CCD array (It is implicit if not already inherent that the image of each of the pixels is captured using more than one cell in the CCD array.).

[9] Regarding **claim 6**, Sandstrom further comprises:

tilting the pixel (FIG. 2; FIG. 3; FIG. 4) through a plurality of desired angles (Col. 7, lines 36 - 38); and

performing the capturing step for each of the desired angles (those angles desired from the possible “25 levels (plus zero)” to perform the calibration as outlined in Col. 13, lines 20 – 34 are performed).

[10] Regarding **claim 7**, Sandstrom further comprises:

tilting the pixel (FIG. 2; FIG. 3; FIG. 4) through a plurality a set of angles (Col. 7, lines 36 - 38); and

performing the capturing step for each angle in the set of angle (those angles in the set from the possible “25 levels (plus zero)” to perform the calibration as outlined in Col. 13, lines 20 – 34 are performed)

using interpolation to determine a voltage value that moves the pixel to an angle outside the set of angles (“interpolating” in Col. 7, lines 36 - 38).

[11] Regarding **claim 9**, Sandstrom further comprises forming the apodized pupil using one of an annular (FIG. 6, element 608) and a semi-circular pattern

[12] Regarding **claim 13**, claim 3 recites identical features as in claim 13. Thus, references/arguments equivalent to those presented for claim 3 are equally applicable to claim 13.

[13] Regarding **claim 15**, claim 5 recites identical features as in claim 15. Thus, references/arguments equivalent to those presented for claim 5 are equally applicable to claim 15.

[14] Regarding **claim 19**, Sandstrom further comprises wherein:

the voltage moves each of the pixels through a plurality of desired angles (the desired angles of FIG. 4; Col. 5, lines 8-20); and

the correlating device (the device responsible for Col. 13, lines 27 - 31) determined a first result signal for each of the desired angles.

[15] Regarding **claim 20**, claims 7 and 19 recite identical features as in claim 20. Thus, references/arguments equivalent to those presented for claims 7 and 19 are equally applicable to claim 20.

[16] Regarding **claim 21**, Sandstrom further comprises using projection optics of a lithography tool (“The present invention relates to printing of patterns...” in Col. 1, lines 10 - 12) as the optical system (FIG. 6, element 604).

[17] Regarding **claim 24**, while Sandstrom discloses a system (Col. 2, lines 27 - 53) comprising:

a voltage value storage (Col. 5, lines 12 – 13; Col. 13, lines 30 - 35) having a voltage value (any applied voltage has a “voltage value”) to pixels (FIG. 2; FIG. 3; FIG. 4) in a spatial light modulator (SLM) (FIG. 4; Col. 2, lines 66 – 67; FIG. 6, element 601) to move the pixels (FIG. 4);

a device (FIG. 4A, elements 402, 404) configured to apodize a pupil (fig. 6, element 608) in an optical system;

a detector ((“CCD camera” in Col. 13, lines 3 - 7)) configured to capture an image from light that has reflected off the SLM (FIG. 4A, element 401) and passed through the device;

a correlating device (the device responsible for Col. 13, lines 27 - 31) configured to correlate the image and the voltage value to generate a result signal (“...series of test patterns...” in Col. 13, lines 27 - 31); and

a controller configured to calibrate the pixels using the result signal (Col. 13, lines 20 - 34), Sandstrom does not teach using a semi-plane knife-edge to block from one side a zero order lobe of a pixel diffraction pattern at the apodized pupil (though Sandstrom suggests there exists a lobe (whether main or side is not specified) that is blocked from a pixel diffraction pattern at the apodized pupil).

Yonekubo discloses an optical recording medium that teaches blocking a portion of a zero order lobe (FIG. 26, element 39 and FIG. 28, element 43 are the primary lobes that have blocked portions due to the slit) of a pixel diffraction pattern (FIG. 10, element 4a) at the apodized pupil (circular objects in FIG. 26 and FIG. 28)

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the apodized pupil of Sandstrom to include blocking a portion of a zero order lobe of a pixel diffraction pattern as taught by Yonekubo to create “a method of providing means for imparting a phase difference to the laser beam entering the objective lens is also applicable as another method for causing the foregoing optical super-resolution phenomenon.”, Yonekubo, Col. 3, lines 60 – 64 and “[b]y further shielding part of the main lobe, detrimental noise components mixed in the main lobe can be removed, thereby further improving the quality of a regeneration signal”, Yonekubo, Col. 3, lines 27 – 30.

Latta teaches using a semi-plane knife-edge (fig. 4, element 74) to block light from one side (fig. 4).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the device used for blocking a zero order lobe of a pixel diffraction pattern at the apodized pupil of Sandstrom in view of Yonekubo to use a semi-plane knife-edge to block from one side as taught by Latta as “[t]he knife-edge technique allows the system to distinguish between light coming from the upper and lower apertures 66 and 68 in the mask...and on the other side of the focus it blocks light from the lower aperture”, Latta, col. 4, lines 41-47.

[18] **Claims 10 and 18** are rejected under 35 U.S.C. 103(a) as being unpatentable over Sandstrom (US 6,399,261 B1) in view of Yonekubo et al. (US 6,014,360 A), Latta et al. (US 5,253,236 A) and Evans et al. (US 5,965,330 A).

[19] Regarding **claim 10**, while Sandstrom in view of Yonekubo and Latta discloses the method of claim 1, Sandstrom in view of Yonekubo and Latta does not teach further comprising forming the apodized pupil using one of a semi-plane, a shearing grating, and an algorithm derived apodization pattern, such that variations are present in at least one of transmittance and phase.

Evans discloses a method for fabricating annular mask lens having diffraction-reducing edges (FIG. 13) that includes forming an apodized pupil using one of an algorithm derived apodization pattern (Col. 13, lines 33 - 56), such that variations are present in at least one of transmittance (Col. 13, lines 33 - 56) and phase.

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the annular apodized pupil of Sandstrom in view of Yonekubo and Latta to include forming the annular apodized pupil using an algorithm derived apodization pattern, such that variations are present in at least one of transmittance and phase as taught by Evans because “[t]he improved mask eliminates the “halo effect” associated with conventional annular masks...”, Evans, Col. 2, lines 25 – 30.

[20] Regarding **claim 18**, claim 10 recites identical features as in claim 18. Thus, references/arguments equivalent to those presented for claim 10 are equally applicable to claim 18.

[21] **Claims 22-23** are rejected under 35 U.S.C. 103(a) as being unpatentable over Sandstrom (US 6,399,261 B1) in view of Yonekubo et al. (US 6,014,360 A), Latta et al. (US 5,253,236 A) and Pedersen (US 6,369,879 B1).

[22] Regarding **claim 22**, while Sandstrom in view of Yonekubo and Latta disclose the method of claim 1, Sandstrom in view of Yonekubo and Latta do not teach wherein the image of each of the pixels is captured using one cell in a CCD array.

Pendersen discloses a method for determining the coordinates of an object (FIG. 2) that include wherein the image (FIG. 2, element 16) of each of the pixels (“one to one” in Col. 4, line 59 – Col. 5, line 8) is captured using one cell in the CCD array (FIG. 2, element 26).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the CCD array and image of each of the pixels of Sandstrom in view of Yonekubo and Latta to include wherein the image of each of the pixels is captured using one cell in the CCD array as taught by Pendersen so that “each LCD pixel is uniquely identified with a number”, Pendersen, Col. 5, lines 9 – 10 and in “detecting at known detector pixel locations the intensity sequence of reflected illumination from the surface of the object whereby the identity and location of the originating illuminated pixel can be determined”, Pendersen, Col. 2, lines 59 – 62.

[23] Regarding **claim 23**, claim 22 recites identical features as in claim 23. Thus, references/arguments equivalent to those presented for claim 22 are equally applicable to claim 23.

Response to Arguments

[24] Applicant’s arguments filed on January 16, 2008 with respect to **claims 1, 10, 12 and 18** have been respectfully and fully considered, they are not found persuasive.

[25] **Summary of Remarks** regarding **claims 1 and 12**:

Applicant’s argue that neither Sandstrom and Yonekubo, taken alone or in combination do not teach or suggest at least this feature of claims 1 and 24 because they cannot be used to establish a prima facie case of obviousness. (Applicant Resp. at 8, January 16, 2008.)

[26] Examiner's Response regarding claims 1 and 12:

However, Applicant's arguments with respect to claims 1 and 12 have been considered but are moot in view of the new grounds of rejection. Though Sandstrom in view of Yonekubo does not teach using a semi-plane knife-edge to block, from one side, a zero order lobe of a pixel diffraction pattern at the apodized pupil, Latta teaches using a semi-plane knife-edge (fig. 4, element 74) to block light from one side (fig. 4). It would have been obvious to one of ordinary skill in the art at the time the invention was made for the device used for blocking a zero order lobe of a pixel diffraction pattern at the apodized pupil of Sandstrom in view of Yonekubo to use a semi-plane knife-edge to block from one side as taught by Latta as "[t]he knife-edge technique allows the system to distinguish between light coming from the upper and lower apertures 66 and 68 in the mask...and on the other side of the focus it blocks light from the lower aperture", Latta, col. 4, lines 41-47.

[27] Summary of Remarks regarding claims 10 and 18:

Applicant's argue as discussed above with respect to claims 1 and 24, from which 10 and 18 respectively depend, Sandstrom and Yonekubo fail to teach "using a semi-plane knife- edge to block, from one side, a zero order lobe of a pixel diffraction pattern at the apodized pupil." Evans likewise fails to teach this feature. (Resp. at 8.)

[28] Examiner's Response regarding claims 10 and 18:

However, Applicant's arguments with respect to claims 1 and 12 have been considered but are moot in view of the new grounds of rejection. Though Sandstrom in view of Yonekubo does not teach using a semi-plane knife-edge to block, from one side, a zero order lobe of a pixel diffraction pattern at the apodized pupil, Latta teaches using a semi-plane knife-edge (fig. 4, element 74) to block light from one side (fig. 4). It would have been obvious to one of ordinary skill in the art at the time the

invention was made for the device used for blocking a zero order lobe of a pixel diffraction pattern at the apodized pupil of Sandstrom in view of Yonekubo to use a semi-plane knife-edge to block from one side as taught by Latta as “[t]he knife-edge technique allows the system to distinguish between light coming from the upper and lower apertures 66 and 68 in the mask...and on the other side of the focus it blocks light from the lower aperture”, Latta, col. 4, lines 41-47.

Conclusion

[29] The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US 4904068 A; US 5515158 A; US 5754294 A; US 5756981 A; US 6377295 B1.

[30] Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David P. Rashid whose telephone number is (571) 270-1578. The examiner can normally be reached Monday - Friday 8:30 - 17:00 ET.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vikkram Bali can be reached on (571) 272-7415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/David P. Rashid/
Examiner, Art Unit 2624

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